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Corporate Diversification and CEO Compensation: Evidence from the Moderating Effect of Firm Size

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Abstract

This study uses firm size as the moderator to test whether firm size influences the relationship between corporate diversification and CEO compensation. Consistent with prior research, we measure corporate diversification in two dimensions, i.e. international diversification and industry diversification, and measure firm size using total assets.

Using a sample of 2,448 CEOs across 1,622 firms during the period 1997-2002, we conduct multiple regression analysis to examine the role of firm size as a moderator variable on the relationship between international diversification and industry diversification and CEO total compensation with tenure, age, duality, and gender as control variables. The test results indicate that firm size moderates the relationship between both international diversification and industrial diversification and CEO total compensation, controlling for other factors that affect CEO compensation. Specifically, we find firm size significantly and positively influences the relationship between international diversification and CEO compensation. However, firm size significantly and negatively influences the relationship between industrial diversification and CEO compensation.

Keywords: corporate diversification, CEO compensation, firm size, international diversification, industry diversification, moderating effect.

I. INTRODUCTION

Extant literature documents a strong association between CEO compensation and certain firm characteristics. Prior research on managerial compensation (Jensen & Murphy, 1990a & 1990b; and Sanders & Carpenter, 1998) documents a positive effect of firm size on managerial compensation. Since executives who manage larger and more complex firms require greater knowledge and ability than executives of smaller and less complex firms, they require a higher level of compensation in the external labor market

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(Becker, 1964; Rosen, 1982; and Gaver & Gaver, 1995). Benchmarking by firm size has been used as a popular practice by the board to set executive compensation (Hall & Murphy, 2003). On the other side, Duru and Reed (2002) find evidence on the relationship between corporate diversification and CEO compensation. Specifically, firms engaged in geographic diversification provide higher CEO pay, while industrial diversification is associated with lower CEO pay.

Moreover, while firm size is a key determinant of CEO compensation (Singh & Agarwal, 2003), firm size is found to be associated with other factors that affect CEO compensation. For example, Kim et al. (2001) show that firm size is positively associated with a firm's international diversification, which may have implications on CEO compensation. The relationship between international diversification, industrial diversification, and total compensation may change as firm size increases. CEOs who work in large firms with a high international diversification should be compensated for the increased work burden they carry.

Our study seeks to expand existing research by using firm size as a moderating variable for the association between corporate diversification and CEO compensation. Given the distinctive effects of international diversification and industrial diversification on CEO compensation, we explore the interaction effects of firm size on both international diversification and industrial diversification and CEO compensation.

Our results indicate that firm size has a significantly positive influence on the relationship between international diversification and CEO compensation. However, firm size has a significant negative moderating effect on the relationship between industrial diversification and CEO compensation. Our study contributes to the extant literature on managerial compensation by providing new evidence that firm size significantly influences and moderates the relationship between CEO compensation and the two diversification dimensions, i.e. international diversification and industry diversification, in different ways.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Prior research (Kim et al., 2001; Duru & Reeb, 2002) measures corporate diversification with both international/geographic diversification and industry diversification, given the distinct impact of the two dimensions of corporate diversification on executive compensation. Specifically, international diversification is positively associated with CEO pay whereas industry diversification has a negative association with CEO compensation (Duru & Reeb, 2002).

On the other side, managerial compensation varies with firm size (Jensen & Murphy, 1990a & 1990b; and Sanders & Carpenter, 1998). Bebchuk and Grinstein (2022) find a positive association between CEO compensation and their past decisions to increase firm size. Managers have incentives to gain more corporate power, control, and perks by increasing firm size (Baumol, 1959; Marris, 1963).

Firms of different sizes would have different strategic objectives (Ueng et al., 2000). For example, operating in a more competitive environment, smaller firms would likely focus on growth and survival as their major objectives (Carr, 1997). In contrast, large firms with stronger market positions tend to concentrate on maintaining their present markets rather than growth.

In a small firm, because of the smaller scale of operations and sales volume, even a big increment in managerial efficiency does not necessarily yield a significant increase in terms of total profits across peers. In contrast, in a large firm, a relatively small increase in profits per unit could result in a large increase in total profits. Thus, large firms with

high sales volume are able to compensate CEOs with a higher salary. Large firms are also often more operationally complex than small firms; CEOs of large firms, consequently, have the more difficult task of managing the firms. Firms engaged in international diversification and industrial diversification are generally those with a larger scope of operations with complex work environments requiring higher compensation for their CEOs. The shareholders and board of directors of larger firms have increased difficulty in monitoring CEOs, therefore it is critical to align the incentives of the CEOs with those of shareholders through higher levels of compensation to their CEOs.

Firm size may also affect the relationship between corporate diversification and CEO compensation. Prior research provides evidence that firm size affects firm diversification (Kim et al., 2001). If firm size is positively associated with a firm's international diversification, then it should have similar implications for CEO compensation. CEOs who work in large firms with a high international diversification should also be compensated for the increased work burden they carry. The influence of both international diversification and industry diversification on managerial compensation may increase as firm size increases. Consequently, firm size may moderate the relationship between international diversification, industry diversification, and CEO compensation such that when a larger firm with a higher level of international diversification and industry diversification may be related to higher CEO pay.

2.1. Hypotheses Development

Based on the preceding literature review, we develop two hypotheses examining whether firm size acts as a moderating variable on the relationship between the two dimensions of corporate diversification, i.e. international diversification and industry diversification, and total CEO compensation.

Existing research studies (Jensen & Murphy, 1990a & 1990b; and Sanders & Carpenter, 1998) have shown that firm size affects managerial compensation. Larger firms give higher CEO pay. Duru and Reeb (2002) document a significant association between both international diversification and industrial diversification and CEO compensation. International diversification is associated with work that is more complex for CEOs than for domestic CEOs in domestic environments. Therefore, firm size may influence and moderate the relationship between international diversification and CEO compensation such that CEOs who work in firms with a high international diversification and larger firm size should have higher compensation for the increased work burden they carry. This influence and interaction effect will be tested as follows:

Hypothesis H_{1A} (alternative): firm size will positively moderate the relationship between international diversification and total compensation.

Duru and Reeb (2002) demonstrate industrial diversification increases the number of business segments thereby reducing overall business risk and earnings volatility, which leads to a negative relationship with managerial compensation. Therefore, we hypothesise that firm size will negatively moderate the relationship between industrial diversification and total compensation.

Hypothesis H_{2A} (alternative): firm size will negatively moderate the relationship between industrial diversification and total compensation.

III. RESEARCH METHODOLOGY

3.1. Regression Model

We use multiple regression analysis to examine the role of firm size as a moderator variable on the relationship between international diversification and industry

diversification and CEO total compensation with tenure, age, duality, and gender as control variables:

The regression equation is as follows:

$$TC_{i,t} = \beta_0 + \beta_1 INTD + \beta_2 INDD + \beta_3 SIZE + B_4 INTD * SIZE + B_5 INDD * SIZE + \beta_6 Tenure + \beta_7 Age + \beta_8 Duality + \beta_9 Gender + \epsilon_{i,t} \dots\dots\dots (1)$$

Following Gaver and Gaver (1995), we use total CEO compensation (TC) as the dependent variable, measured as the sum of salary, bonus, value of restricted stocks granted, value of stock options granted, long-term incentive payouts, stock appreciation rights, and other compensation derived from Standard & Poor’s Compustat ExecuComp database.

The model includes three independent variables (INTD, INDD, SIZE), two moderating variables (INTD*SIZE) and (INDD*SIZE), and four control variables (tenure, age, duality, gender). Table 1 presents definitions and data sources of the independent and control variables.

Table 1
Independent and Control Variables in Regression Model

Variable	Measure (Source)
INTD= International Diversification	Number of international geographic segments reported (Compustat geographic segment file)
INDD= Industry Diversification	Number of industrial segments reported (Compustat industry segment file)
SIZE= Firm Size	Total assets as a measure of firm size (Compustat).
Tenure	Days CEO has held current position as of end of the fiscal year (ExecuComp).
Age	Age of CEO as of end of the fiscal year. (ExecuComp).
Duality	Equal to 1 if CEO also serves as the chairman of the board; otherwise, 0. (ExecuComp)
Gender	Equal to 1 if CEO is male; otherwise, 0 (ExecuComp)

3.2. Sample and Data Collection

The sample consisted of data collected from three databases supplemented with additional data from the securities and exchange commission (SEC) during 1997-2002. Stock return data is obtained from the center for research in security prices (CRSP) while financial statement data is collected from Standard & Poor’s research insight. For CEO data is gathered from Standard & Poor’s (S&P) Compustat ExecuComp (ExecuComp) database, based on the S&P 400, S&P 500, and S&P 600 indices for large, medium, and small-cap firms. Missing data in ExecuComp, particularly relating to age and employment starting dates for CEOs, is corroborated with LexisNexis. Two Compustat files, Compustat’s geographic segment file and Compustat’s industry segment file, are used to classify firms based on international diversification and industry diversification.

3.3. Descriptive Statistics

Sample firms are assigned a primary standard industrial classification (SIC) code based on products disclosed in their 10-K filings and then classified into an industry according to the industry classification scheme suggested by Lippert and Moore (1995). Following the sample selection criterion in Murphy (1985), a CEO is included in the sample only if that individual was listed as CEO for the same firm for at least five years in the 10-K filings during the sample period of 1997-2002. The final sample contains 2,448 CEOs across 1,622 firms during the period 1997-2002.

Industry frequency statistics for the sample are presented in Table 2. The sample firms appear to be evenly distributed across industries with retail and whole as the largest industry accounting for 12.4% of the sample. The CEOs in the sample are dispersed across the industries, with computer & software and retail & wholesales as the industries with the most sample CEOs accounting for 12.2% and 12.5% of the sample, respectively.

Table 2

Industry Distribution for Sample Firms (n = 1,622) and CEOs (n=2,448)

Type of Industry	Firms (n = 1,622)		CEOs (n=2,448)	
	Observations	%	Observations	%
Aerospace and shipbuilding	65	4.0	96	3.9
Agriculture and metal	18	1.1	34	1.4
Cars	26	1.6	42	1.7
Chemical, tire, and leather	42	2.6	73	3.0
Commodity	36	2.2	47	1.9
Computer and software	180	11.1	299	12.2
Construction, wood, furniture, and house	58	3.6	86	3.5
Electric	115	7.1	161	6.6
Entertainment	62	3.8	93	3.8
Finance	141	8.7	190	7.8
Food and tobacco	42	2.6	69	2.8
Health, education, and law	64	3.9	93	3.8
Machinery	88	5.4	138	5.6
Medical, photo, and other	54	3.3	81	3.3
Paper and publishing	54	3.3	81	3.3
Petroleum and refinery	64	3.9	87	3.6
Retail and wholesale	201	12.4	306	12.5
Steel	62	3.8	102	4.2
Textile	25	1.5	34	1.4
Transportation	42	2.6	61	2.5
Utility	106	6.5	160	6.5
Other	77	4.7	115	4.7
Total firms	1,622	100.0	2,448	100.0

IV. RESULTS AND DISCUSSIONS

4.1. Descriptive Statistics

Table 3 presents the summary statistics for the variables. Sample statistics for the dependent variable and three independent variables are presented in Panel A, control variables in Panel B, and firm characteristics in Panel C for the sample period of 1997-2002. An average CEO in the sample is 57 years, holds the CEO position for 6 years, and receives total compensation of \$2.35 million. A vast majority of CEOs are male and about two-thirds of sample CEOs also hold the Chairman position. The average firm has total assets of \$12 million and operates in three international regions and 2.33 industries.

Table 3

Descriptive Statistics

Panel A:						
Test Variables	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Total Compensation	2,434	5,198.95	2,354.79	11,795.97	0.00	273,415.47
International Diver.	2,448	3.29	3.00	1.11	0.00	5.00 ^a
Industry Diver.	2,448	2.55	2.33	1.57	1.00	10.00 ^b
Firm size (Assets)	448	7994.00	1199.97	35813.94	8.66	692789.00

To be continued Table 3.

Panel B:						
Control Variables	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Tenure (days)	1,069	2,947.66	2,192.00	2,774.43	13.00	19,935.00
Age (years)	1,288	56.91	57.00	7.75	36.00	89.00
Duality ^c	2,448	0.56	0.67	0.45	0.00	1.00
Gender ^d	2,448	0.96	1.00	0.18	0.00	1.00
Panel C:						
Firm Characteristics	Obs.	Mean ^c	Median ^c	Std. Dev. ^c	Min. ^c	Max. ^c
Assets	2,448	7,994.00	1,199.97	35,813.94	8.66	692,789.00
Sales	2,448	4,346.94	1,102.44	11,799.42	0.00	180,041.33
Capital Expend.	2,426	312.11	51.39	1,270.14	0.00	31,672.50
EBIT/Sales	2,445	89.7	0.51	796.75	-10,537.00	30,877.00
R&D/Sales	1,464	0.22	0.03	2.70	0.00	96.10
Capital Expend./Sales	2,423	0.13	0.05	1.75	0	85.68
Market Value/ Capital Expend.	2,364	64.27	24.1	264.19	0.05	10,996.64

Notes: ^a Compustat's geographic segment file limits the number of global segments to five; ^b Compustat's industry segment file limits the number of global segments to ten; ^c 0= CEO is not chairperson; 1= CEO is also chairperson; ^d 0=female, 1=male; and ^e in \$thousands.

4.2. Correlation

Table 4 presents the Pearson correlation coefficients for the variables. The strongest correlation coefficient is 0.85 between international diversification and total compensation, followed by the correlation coefficient of 0.751 between firm size and total compensation. All other coefficients are under 0.40. Gujarati (2003) suggests that correlations between independent variables should not be considered "harmful" unless they exceed 0.80 or 0.90. The Pearson correlation coefficients in Table 4 suggest that multi-collinearity is not severe for this study.

Table 4

Pearson Correlation Coefficient Matrix

Variables ^a	1	2	3	4	5	6	7	8
1. Total Compensation	1							
2. International Diversification	0.85**	1						
3. Industry Diversification	0.07**	0.15**	1					
4. Firm size	.751**	-.138**	-.254**	1				
5. Gender ^b	-.008	-.017	.056**	-.025	1			
6. Age	.125**	-.007	.169**	.119**	.108**	1		
7. Duality	.251**	-.003	.105**	.267**	.023	.271**	1	
8. Tenure	.195**	-.120**	.341**	.089**	.127**	.369**	.297**	1

Notes: values ^a of n ranged from 1,069 to 2,448 ^b *p < .01; **p < .05. This table shows the correlations between variables by using Pearson correlation coefficients.

4.3. Multivariate Regression Tests

We conduct hierarchical regression analysis with three steps to enter the variables into the regression equation model. Model 1 contains total compensation and the four control variables, i.e. tenure, age, duality, and gender. Model 2 adds the three predictor variables - international diversification (INTD), industry diversification (INDD), and

firm size (SIZE), to the regression. Finally, Model 3 adds the two moderating variables measured as interaction terms, INTD*SIZE and INDD*SIZE, to obtain the full regression model to test the hypotheses.

The results of the three regression models are presented in Table 5. In Model 1, all four control variables are significant, with tenure and duality (age and gender) positively (negatively) associated with CEO total compensation. In Model 2, all control variables remain significant and all three predictor variables are significant at 0.01 level (INTD, INDD, SIZE). Specifically, international diversification (industry diversification) is associated with higher (lower) CEO compensation, while larger firms give higher CEO pay, consistent with the results in Duru and Reed (2002). In Model 3, the control and predictor variables retained their significance from Model 2 and both moderating variables (INTD*SIZE, INDD*SIZE) are significant, in support of the two hypotheses.

For hypothesis H_{1A}: Firm size will moderate the relationship between international diversification and total compensation.

The coefficient of the interaction term involving firm size and international diversification is 0.077, significant at a 0.05 level, indicating that other things equal, larger firms with international diversification provide higher CEO pay than other firms. Thus, the result supports hypothesis H_{1A} that firm size positively moderates the relationship between international diversification and total compensation.

The coefficient of the interaction term involving firm size and industrial diversification is -0.178, significant at a 0.01 level, indicating that other things equal, larger firms with industry diversification provide lower CEO pay than other firms. Thus, the results support hypothesis H_{2A} that firm size negatively moderates the relationship between industrial diversification and total compensation.

Table 5
Results of Regression Models

Variable (Coefficient)	Beta Value (t-Statistic ^a)		
	Model 1	Model 2	Model 3
INTD= International Diversification (β_1)		.105*** (6.358)	.129*** (7.206)
INDD= Industry Diversification (β_2)		-.074*** (-4.135)	-.124*** (-4.392)
SIZE= Firm Size (β_3)		.591*** (31.961)	.723*** (13.277)
(INTD*SIZE)(β_4)			.077* (2.176)
(INDD*SIZE) (β_5)			-.178** (-3.322)
Tenure (β_6)	.064** (3.124)	.058** (3.447)	.129*** (7.206)
Age (β_7)	-.040† (-1.957)	-.057** (-3.410)	-.057** (-3.427)
Duality (β_8)	.174*** (8.442)	.058** (3.447)	-.061** (3.626)
Gender (β_9)	-.065** (-3.246)	-.052** (-3.173)	-.054** (-3.336)
Adjusted R ²	.039	.357	.360
Change in adjusted R ²	.041***	.318***	.004**

Notes: ^an= 2438; ^bBeta weights and t-values reflect results for the full model † $p < .10$; ^b $p < .05$; ** $p < .01$; *** $p < .001$. When the predicted sign is either (+) or (-), the p value is a one-tailed test; when the predicted sign is (?), then the p value is a two-tailed test.

V. CONCLUSION

This study examines the role of firm size as a moderating variable on the relationship between corporate diversification and CEO compensation. We found that firm size had a significantly and positively moderating effect on the relationship between international diversification and CEO compensation. In contrast, firm size had a significantly and negatively moderating effect on the relationship between industrial diversification and CEO compensation.

Extant research (Jensen & Murphy, 1990a & 1990b; and Sanders & Carpenter, 1998) shows that firm size affects on managerial compensation. Duru and Reeb (2002) also find international diversification and industrial diversification are associated with CEO compensation. This study extends prior research by presenting new evidence that firm size moderate the relationship between both international diversification and industrial diversification and CEO total compensation.

These findings may help decision-makers, such as the board of directors, to construct optimal executive compensation contracts that help reduce agency cost and maximize shareholder wealth by understanding the interactions among firm size, corporate diversification, and CEO compensation. Future research could investigate other moderating variables besides firm size that help in understanding the relationship between these corporate characteristics.

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